

CLAIMS

1. A plasmid vector comprising:

(D1) an integrase gene;

5 (D2) a segment of DNA forming a region for controlling the expression of the integrase gene; and

(D3) a segment of DNA serving as an integrase recognition region when integrase catalyzes the integration reaction.

10 2. A plasmid vector comprising:

(D1) an integrase gene;

(D2) a segment of DNA forming a region for controlling the expression of the integrase gene;

(D3) a segment of DNA serving as an integrase recognition 15 region when integrase catalyzes the integration reaction; and

(D4) any DNA segment to be integrated into the genome of host cells.

3. The plasmid vector according to claim 1 or 2, wherein the

20 DNA segment (D3) at least includes a connecting sequence of terminal bases formed when one LTR is joined to the other LTR.

4. The plasmid vector according to any one of claims 1 to 3,

wherein the plasmid vector includes a region formed by two LTRs 25 joined together, and both of the DNA segments (D2) and (D3) are situated within the region formed by the two LTRs joined together.

5. The plasmid vector according to any one of claims 1 to 4, wherein a DNA segment encoding a nuclear localization signal is further added to the integrase gene.

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6. The plasmid vector according to any one of claims 1 to 5, wherein the integrase gene and/or the LTRs are derived from viruses belonging to Retroviridae.

10 7. The plasmid vector according to claim 6, wherein the viruses belonging to Retroviridae comprise viruses belonging to subfamily Oncovirinae of Retroviridae.

15 8. A transformant transformed by using the plasmid vector according to any one of claims 2 to 7.

9. A chimeric animal other than humans, wherein the plasmid vector according to any one of claims 2 to 7 has been integrated into the genome thereof.

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10. A transgenic animal other than humans, wherein the plasmid vector according to any one of claims 2 to 7 has been integrated into the genome thereof.

25 11. A method for producing a bird that has incorporated foreign DNA, the method comprising the steps of:

injecting into an embryo in an egg of a bird the plasmid vector according to any one of claims 2 to 7;

allowing the DNA segment (D4) according to any one of claims 2 to 7 to integrate into the genome of cells that constitute the 5 embryo; and

hatching the egg to obtain an individual that has incorporated the DNA segment (D4).

12. A method for producing a bird that has incorporated foreign 10 DNA, the method comprising the steps of:

introducing the plasmid vector according to any one of claims 2 to 7 into primordial germ cells collected from a bird embryo at an early developmental stage;

allowing the DNA segment (D4) according to any one of claims 15 2 to 7 of the plasmid vector to integrate into the genome of the primordial germ cells;

injecting the primordial germ cells that have incorporated the DNA segment (D4) into an early embryo in an egg laid by other individuals; and

20 hatching the egg to obtain an individual that has incorporated the DNA segment (D4).

13. A method for producing a transgenic bird, wherein the individual according to any one of claim 11 or 12 whose germline 25 cells have incorporated foreign DNA is allowed to naturally mate or artificially fertilized.

14 A method for producing a transgenic animal, wherein the plasmid vector according to any one of claims 2 to 7 is injected into a testis of a male non-human vertebrate animal, and the animal 5 having the plasmid vector injected thereinto is allowed to naturally mate or artificially fertilized.

15. A method for producing a useful substance comprising the steps of:

10 providing the plasmid vector according to any one of claims 2 to 7, wherein the segment (D4) of the plasmid vector includes a region encoding a protein and a control region for controlling the expression of the protein;

introducing the plasmid vector into a host cell; and

15 allowing the DNA segment (D4) to integrate into genome of the host cell such that the protein encoded by the DNA segment (D4) is expressed in the host cell to produce the useful product.

16. A method for producing a useful substance comprising the 20 steps of:

providing the plasmid vector according to any one of claims 2 to 7, wherein the segment (D4) of the plasmid vector includes a region encoding a protein and a control region for controlling the expression of the protein;

25 injecting the plasmid vector into a bird embryo; and allowing the DNA segment (D4) to integrate into the genome

of cells that constitute the embryo to produce a bird that has incorporated the DNA segment (D4) in somatic cells such that the useful substance is produced in an egg laid by the bird that has incorporated the DNA segment (D4).

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17. A method for producing a useful substance comprising the steps of:

providing the plasmid vector according to any one of claims 2 to 7, wherein the segment (D4) of the plasmid vector includes 10 a region encoding a protein and a control region for controlling the expression of the protein;

injecting the plasmid vector into an embryo in an egg of a bird;

allowing the DNA segment to integrate into the genome of 15 cells that constitute the embryo;

hatching the egg to obtain a first generation bird the germline cells of which have incorporated the DNA segment; and

obtaining the useful substance in eggs laid by birds selected from the group consisting of:

20 a transgenic bird heterozygous with respect to the DNA segment produced by allowing the first generation birds to naturally mate or artificially fertilizing the first generation birds;

a transgenic bird heterozygous or homozygous with 25 respect to the DNA segment produced by allowing the heterozygous birds to naturally mate or artificially fertilizing the

heterozygous birds; and

a transgenic bird heterozygous or homozygous with respect to the DNA segment produced by continuing to cross the heterozygotic or homozygotic birds through successive generations.

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18. A method for producing a useful substance comprising the steps of:

providing the plasmid vector according to any one of claims 10 2 to 7, wherein the segment (D4) of the plasmid vector includes a region encoding a protein and a control region for controlling the expression of the protein;

introducing the plasmid vector into primordial germ cells collected from a bird embryo at an early developmental stage;

15 allowing the DNA segment of the plasmid vector to integrate into the genome of the primordial germ cells;

injecting the primordial germ cells that have incorporated the DNA segment into an early embryo in an egg laid by other individuals;

20 hatching the egg to obtain a first generation bird the germline cells of which have incorporated the DNA segment; and

obtaining the useful substance in eggs laid by birds selected from the group consisting of:

a transgenic bird heterozygous with respect to the 25 DNA segment produced by allowing the first generation birds to naturally mate or artificially fertilizing the first generation

birds;

a transgenic bird heterozygous or homozygous with respect to the DNA segment produced by allowing the heterozygous birds to naturally mate or artificially fertilizing the

5 heterozygous birds; and

a transgenic bird heterozygous or homozygous with respect to the DNA segment produced by continuing to cross the heterozygotic or homozygotic birds through successive generations.